

SURGICAL FASTENING APPARATUS

This application is a continuation of U.S. application Ser. No. 12/899,617, filed Oct. 7, 2010, now U.S. Pat. No. 8,413, 872, which claims priority to U.S. Provisional application Ser. Nos. 61/326,292, filed Apr. 21, 2010, and 61/255,529, filed Oct. 28, 2009. The entire contents of each of these applications are incorporated herein by reference.

BACKGROUND**1. Technical Field**

The present disclosure relates to a surgical fastening apparatus and, more particularly, to a surgical fastening apparatus having a fastener and retainer system.

2. Background of the Related Art

Various types of surgical stapling instruments for performing a circular anastomosis are well known, wherein an operator actuates the apparatus at a location which is relatively remote from the location at which the circular anastomosis takes place. Anastomosis is the surgical joining of separate hollow organ sections. Typically, an anastomosis procedure involves surgery in which a diseased or defective section of hollow tissue is removed.

A conventional surgical stapling instrument for performing a circular anastomosis in a hemorrhoidal or other surgical procedure generally includes a shell assembly having an annular array of staples and staple slots and an anvil assembly having a circular array of staple forming pockets in a proximal surface thereof. An example of surgical stapling instruments for performing circular anastomosis is described in U.S. Pat. Nos. 7,168,604, 7,303,106 and pending U.S. application Ser. No. 12/550,443, filed Aug. 31, 2009, all which are incorporated herein in their entirety by reference. Typically, the anvil assembly is longitudinally movable from an open position to a closed position which places the anvil assembly adjacent to the shell assembly to clamp the body tissue therebetween. After bringing the anvil and shell assemblies to a closed position to clamp tissue, an annular pusher including a plurality of pushers which are configured to eject a corresponding staple from the staple slot through the tissues and against a receiving pocket of the anvil to form staples is actuated by the operator in a relatively remote region to perform a circular anastomosis. After stapling the tissues together, the tissue is severed by the annular blade and extracted.

Surgical fastening instruments applying two part surgical fasteners are known. In these instruments, a plurality of retainers are supported in an anvil assembly and a plurality of fasteners are supported in a fastener holding assembly. The fasteners are advanced through tissue and into engagement with openings in respective retainers. These two part fasteners are typically composed of resorbable material. The firing force of the fasteners in some of these instruments could shift the retainers out of position which may result in misalignment. In addition, the retainers may slip against the anvil and/or may come off the anvil before firing which may also result in misalignment. Accordingly, it would be advantageous to provide a configuration which enhances mating of the fasteners and the retainers and it may be useful to provide such configuration in a circular anastomosis instrument.

SUMMARY

In accordance with the present disclosure, a surgical fastening apparatus includes in one aspect a fastener retaining frame which includes a first annular portion having a plurality

of retainers disposed thereon and a second annular portion having a plurality of perforations formed therein. A fastener guide member contains a plurality of surgical fasteners mateable with the plurality of retainers to fasten tissue therebetween. The fastener retaining frame is detachably secured to a frame supporting structure. An annular pusher ejects the plurality of surgical fasteners from the fastener guide member towards the plurality of corresponding retainers. An annular blade severs the plurality of perforations after the plurality of surgical fasteners have been mated with the plurality of retainers.

In one embodiment, the surgical fastening apparatus further includes a flange member for detachably securing the fastener retaining frame, wherein the flange member is fixedly attached to an anvil. The second annular portion defining the plurality of perforations may be concentrically arranged within the first annular portion having the plurality of retainers circumferentially disposed thereon. In an embodiment, the first annular portion has a plurality of links connecting the plurality of retainers circumferentially disposed thereon forming a single body of retainers. In an alternative embodiment, the plurality of retainers are monolithically formed. In one embodiment, the first annular portion is monolithically formed with the second annular portion. The plurality of retainers circumferentially disposed on the first annular portion of the fastener retaining frame may be arranged to define two concentric rings of retainers.

In one embodiment, the plurality of retainers are substantially uniformly spaced apart. In another embodiment, the plurality of circumferentially disposed perforations on the second annular portion are substantially uniformly spaced apart. The retainers may be made of biodegradable polymer. The plurality of surgical fasteners may also be made of biodegradable polymer. The fastener retaining frame may be made of biodegradable polymer.

In one embodiment, the flange member defines an annular recess to dispose therein the fastener retaining frame, wherein the flange member can include a ledge to securely dispose the fastener retaining frame in the annular recess thereof. A distal side of the fastener retaining frame may be axially tapered with respect to the thickness thereof. The annular recess defined by flange member may also be axially tapered with respect to the thickness thereof corresponding to the axially tapered fastener retaining frame. The fastener retaining frame in some embodiments has a snap-fit configuration with the flange member.

In one embodiment, each of the plurality of perforations defined in the second annular portion has a radially notched portion configured to facilitate breaking off thereof upon actuation of the annular blade. In another embodiment, each of the plurality of perforations defined in the second annular portion has a pair of opposing slits configured to facilitate breaking off thereof upon actuation of the annular blade. In one embodiment, the plurality of surgical fasteners are configured to snap-fit with the plurality of retainers. In some embodiments, the thickness of a part defining the plurality of perforations in the second annular portion of the fastener retaining frame is less than that of the rest of the second annular portion to facilitate breaking off of the plurality of perforations. In some embodiments, the fastener retaining frame may be elastic. In some embodiments, the fastener guide member may include a plurality of fastener slots axially extending and circumferentially arranged for accommodating therein the plurality of surgical fasteners.